



Intel® High Definition Audio

Integrated Audio for Today and Tomorrow

Audio on the desktop PC has come a long way from the warning beeps of the original PC. Most systems today offer 44-kHz/16-bit stereo CD quality, and many even add multiple channels to provide a Dolby® Digital or DTS®-type surround-sound experience.

Integrated audio solutions such as AC'97 are cost-effective and offer a good end-user experience in both stereo and multi-channel formats. However, the current integrated audio capabilities fall short in meeting the requirements of the next generation of PCs designed for digital entertainment.

Intel has worked with the industry to develop a new specification for integrated audio that is capable of delivering the features and high-end performance of an add-in audio card. Intel® High Definition Audio (Intel® HD Audio) is capable of playing back more channels at higher quality than previous integrated audio formats. In addition, Intel® HD Audio has the technology needed to support the latest and greatest audio content. By enabling enhanced usage models, Intel HD Audio, when combined with the Intel® 915G, 915P and 925X Express chipsets will also change how computer users interact with sound.



The Challenge to Find Better Audio

When AC'97 was initially developed users were typically listening to only music and movies with stereo sound. With the success of DVD movies encoded with Dolby Digital and DTS multi-channel audio formats, users have become accustomed to listening in full surround sound with anywhere from six to eight speakers.

While AC'97 technology has struggled to keep pace with all these advancements, Intel HD Audio is designed specifically for the high-quality multi-channel audio experiences of today and tomorrow. Newer audio and video encoding/decoding algorithms also enable a higher-quality listening experience.

With the explosion of digital content, more and more consumers are moving their computers into the living room or family room so they can enjoy digital music or movies throughout the house on state-of-the-art multi-channel stereo systems or big screen TVs. With better speakers connected to their computers, the limitations of current computer sound subsystems, whether integrated or add-in, can ruin the digital experience.

Many consumers are also starting to ask for the ability to play two different audio streams through their PC at the same time—perhaps classical music in the study and a movie in the living room. These demands cannot be met with current audio solutions.

An Outstanding Audio Experience

Intel HD Audio delivers significant improvements over previous generation integrated audio and sound cards. Designed to support the convergence of digital entertainment, the Intel HD Audio specification delivers the features needed for an improved audio experience.

Intel HD Audio is capable of delivering the support and sound quality for up to eight channels at 192 kHz/32-bit quality, while the AC'97 specification can only support six channels at 48 kHz/20-bit. In addition, Intel HD Audio is architected to prevent the occasional glitches or pops that other audio solutions can have by providing dedicated system bandwidth for critical audio functions.

Innovative Uses for the Digital Home

Dolby Laboratories* selected Intel HD Audio to bring Dolby-quality surround sound technologies to the PC, as part of their recently announced PC Logo Program. The combination of these technologies marks an important milestone in delivering quality digital audio to consumers. Intel HD Audio will be able to support all the Dolby technologies, including the latest Dolby Pro Logic* IIx, which makes it possible to enjoy older stereo content in 7.1 channel surround sound.

Another consumer need is for the ability to play back two different audio tracks, such as a CD and a DVD simultaneously, which can't be done using current audio solutions. Intel HD Audio features multi-streaming capabilities that give users the ability to send two or more different audio streams to different places at the same time, from the same PC. Here are examples of how this can be used:

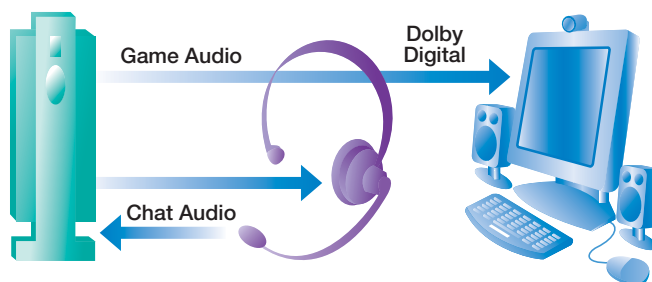


Figure 1: You can play a game online and chat with the other players by sending the game sound to 5.1 speakers while the Internet chatting audio is sent through your headset.

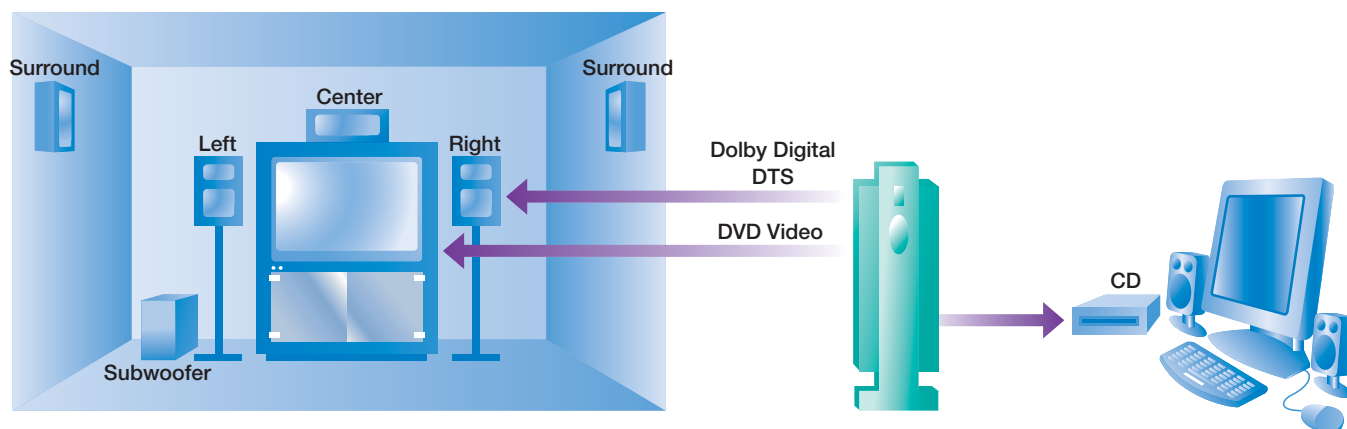


Figure 2: A DVD movie with 5.1 audio can be sent to a surround sound system in the living room, while you listen to digital music and surf the Web on the PC.

Intel HD Audio handles these and other applications with ease, which is attractive to users as multiple, simultaneous applications become more commonplace in the digital home.

Microsoft* has chosen Intel HD Audio as the main architecture for their new Unified Audio Architecture* (UAA), which provides one driver that will support all Intel HD Audio controllers and codecs. While the Microsoft driver is expected to support basic Intel HD Audio functions, codec vendors are expected to differentiate their solutions by offering enhanced Intel HD audio solutions. The result is high-quality PC based audio that delivers a seamless convergence of digital entertainment between the PC and consumer electronic devices.

Enhanced Features

Intel HD Audio also enables enhanced voice capture through the use of array microphones, giving users more accurate speech input. While other audio implementations have limited support for simple array microphones, Intel HD Audio supports larger array microphones. By increasing the size of the array microphone, users get incredibly clean input through better noise cancellation and beam forming. This produces higher-quality input to voice recognition, Voice over IP (VoIP), and other voice-driven activities.

Intel HD Audio also provides improvements that support better jack retasking. The computer can sense when a device is plugged into an audio jack, determine what kind of device it is, and change the port function if the device has been plugged into the wrong port. For example, if a microphone is plugged into a speaker jack, the computer will recognize the error and can change the jack to function as a microphone jack. This is an important step in getting audio to a point where it 'just works'—users won't need to worry about getting the right device plugged into the right audio jack.

The Solution for the Future

Intel HD Audio helps audio reach new levels with digital quality audio and compelling new usage models for digital home/office applications. Designed for "glitch-free" audio playback, multi-streaming, jack retasking, and UAA support, Intel HD Audio offers an audio solution for years to come. As one of the many new technologies introduced with the Intel® 925X and 915 Express chipset family, Intel HD Audio enhances the end-user experience and enables the convergence of digital entertainment for both PCs and Consumer Electronics (CE) products.

For more information, visit the Intel Web site at: intel.com/design/chipsets/hdaudio.htm

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**Some HD Audio functionality is dependent on actual implementation, controller, and codec.

